

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Douglas S. Forrer

Serial No.: 10/658,003

Group Art Unit: 3673

Filing Date: September 9, 2003

Examiner: Sunil Singh

For: REFLECTIVE PAVEMENT MARKER

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**DECLARATION OF DAVID McHUGH UNDER 37 CFR 1.132**

I, David McHugh, declare as follows:

1. I am presently the Regional Sale Manager of Ray-O-Lite, Inc, including the State of Florida. I have been associated with the commercial sale of highway pavement markers for five years.

2. I have read and am familiar with the outstanding Office Action, Paper No. 20040730. Additionally, I have read and am familiar with the references U.S. Patent 3,332,327; U.S. Patent 6,325,515; and the Internet article entitled "Acrylic (Polymethyl-Methacrylate) Specifications" encompassing three pages and dated 1999. It is my understanding that the basis of the rejection of pending claims 1, 3-20, and 22-25 in amended form is that since polymethyl-methacrylate has previously been used to make road marker shells and that the specification article recites a broad range of flexural strength and modulus encompassing the narrower claimed range, that claim limitation as to values of flexural modulus and strength are inherent.

3. I state that the present invention as embodied in independent claims 1, 13 and 20 having limitations as to tensile strength and flexural modulus affords a reflective pavement marker that has an operable lifetime that far exceeds that of pavement markers formed from a

polymer not satisfying claim limitations. My statement is based upon the information found below in Paragraphs 4-8.

4. A reflective pavement marker made according to the limitations of independent claims 1 and 13 was designated as marker AA-ARC II-FH, specifications for which are provided at Appendix A. The AA-ARC II-FH marker specifications note that the reflective lens and shell are molded of a specially formulated optic grade methyl methacrylate designed for impact resistance consistent with the claim limitations.

5. The AA-ARC II-FH marker produced according to the pending claims was submitted to the Florida Department of Transportation for testing according to Section 970 of Florida Test Specifications that include Florida Test Method Designation FM 5-566 and Federal Specifications FF-1825A. The Florida test methodology Section 970 is provided at Appendix B and includes performance requirements, definitions and product acceptance criterion.

6. A list of qualified products approved by the Florida Department of Transportation is provided at Appendix C. The reference found for each of the samples tested under "Other References Pertaining to "S970" relates to testing under Section 970 as detailed in Appendix B. In the qualified product list found at Appendix C only our marker AA-ARC II-FH received no limitations except that "For Use Only On Projects Let 01-2001 Or After" while others had only conditional approval and Class B status. According to Section 970-1.2.1, Class B status corresponds to a permanent marker having long life (greater than six months) and a hard abrasion-resistant lens. None of the other markers tested were without conditional approval designation and were approved only on a conditional basis. The Ray-O-Lite® square shoulder marker having the GPL number S706-0101 is a marker with which I am familiar and would satisfy pending claim limitations with the exception of not having the tensile strength or flexural

modulus requirements of the pending claims. The Ray-O-Lite® square shoulder marker was not able to attain approval as a Class B marker. Additionally, the luminosity of a marker made according to the present claims satisfied the luminous intensity requirements according to Florida Specification 970 after two years of field performance testing, as shown in Appendix D. Subsequently, AA-ARC II-FH received full approval with the only exception being its use only on contracts after January, 2001. No other marker tested to date has yet to achieve this level of performance.

7. In my opinion, the ability to satisfy the luminous intensity requirements of Florida Specification 970 resides in the ability of the shell to withstand deformation and breakage over the field performance test life so as to preclude environmental contaminants such as dirt and water from degrading reflectivity of the marker. I attribute the ability of the AA-ARC II-FH to pass the Florida Specification 970 requirements, as stated in the specification sheet provided at Appendix A as being the result of the use of an optical grade methyl methacrylate having the claimed limitations of a tensile strength greater than 10,000 pounds per square inch and a flexural modulus of greater than 450,000 pounds per square inch. I base this conclusion on the fact that the Ray-O-Lite® square shoulder marker has a similar construction, yet the polymer shell does not meet these claim limitation.

8. In the claimed invention, the determination that this combination of tensile strength and flexural modulus was necessary to achieve impact resistance suitable for producing a permanent pavement marker resulted from the testing of a large number of possible polyacrylates and polycarbonates. Of all the polymers tested to form shells, only those that had both a tensile strength greater than 10,000 pounds per square inch and a flexural modulus of greater than 450,000 performed adequately. As I can point to no other difference between

marker AA-ARC II-FH and the other markers tested by the Florida Department of Transportation that did not receive approval as a Class B marker. I believe this difference lies in the shell being formed of a polymer having tensile strength and flexural modulus as claimed.

10. Based on the above considerations, I believe that combining Heenan, Coderre and "Poly(Methyl-Methacrylate) Specifications" does not lead one to the critical limitations as to tensile strength and flexural modulus according to the claimed invention.

11. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therein.

\_\_\_\_/David S. McHugh/\_\_\_\_\_  
David McHugh

Date: \_\_February 1, 2005\_\_\_\_

# **PAC-TEC, INC.**

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## **Specification Sheet Pac Tec Inc.**

### **Ray-O-Lite® AA-ARC II-FH Reflective Pavement Marker**

**Materials:** The reflective lens and shell is molded of specifically formulated optic grade methyl methacrylate designed for impact resistance. The lens is coated with an optically clear hard coat for abrasion resistance conforming to ASTM D 4280 for hard-surfaced markers.

The fill material shall consist of inert thermosetting compound with filler designed for impact and wear resistance.

The internal shell is coated for protection from moisture with a primer resin.

**References:** ASTM D 4280 and Florida Test Method Designation FM 5-566 dated September 1, 2000. Federal Specifications FF-1825A Wool and Gauze Metallic.

**Laboratory Tests:** Compressive Strength – ASTM D 4280 Section 9.3.2  
Flexural Strength – ASTM D 4280 Sections 9.3.1.1; 9.3.1.2; 9.3.1.3  
Coefficient of Luminous Intensity - ASTM D 4280 Sections 9.2.1; 9.2.2  
Lens Impact Strength – ASTM D 4280 Sections 9.5.1; 9.5.1.1; 9.5.1.2  
Table 1 Coefficient of Luminous Intensity- ASTM D 4280  
Resistance to Temperature Cycling – ASTM D 4280 Sections 9.5.2; 9.5.2.1

Initial

As of 3-4-03

**970 MATERIALS FOR RAISED RETRO-REFLECTIVE PAVEMENT MARKERS AND BITUMINOUS ADHESIVE.**

(REV 11-14-02) (FA 12-10-02) (7-03)

SECTION 970 (Pages 911 and 912) is deleted and the following substituted:

**SECTION 970**  
**MATERIALS FOR RAISED RETRO-REFLECTIVE PAVEMENT**  
**MARKERS AND BITUMINOUS ADHESIVE**

**970-1 Raised Retro-Reflective Pavement Markers.**

**970-1.1 Composition:** The marker shall consist of materials conforming to ASTM D 4280.

**970-1.2 Physical Requirements:** The physical size of the RPM shall conform to the requirements of ASTM D 4280. Laboratory and field samples for RPMs and bituminous adhesives shall meet the requirements of ASTM D 4280 and include the following requirements:

The minimum area of each reflective face shall be 2.5 in<sup>2</sup> [1,600 mm<sup>2</sup>]. The minimum base size shall be 12 in<sup>2</sup> [7,750 mm<sup>2</sup>].

**970-1.2.1 Designation of Marker Type, Color and Classification:** The marker description shall be in order of type, color and reflective surface condition in accordance with ASTM D 4280 and the following chart.

RPM Class			
Class	Description	Expected Normal Service	ASTM Surface Designation
A	Temporary marker	Up to six months	none
B	Permanent marker	Long life	H, hard abrasion resistant lens
D	Work zone marker	Per project requirement	none
E	Temporary work zone	Up to five days	none

**970-1.3 Performance Requirements:** The RPM shall meet the performance requirements specified in ASTM D 4280, Section 6.2, for luminous intensity, flexural strength, compressive strength, resistance to cracking, and thermal cycling, as modified herein. Test method FM 5-566 will be used to evaluate marker performance.

**970-1.3.1 Class A Markers:** Meet the coefficient of luminous intensity requirements of ASTM D4280. Abrasion treatment is not required for Class A Markers.

**970-1.3.2 Class B (Abrasion Resistant) Markers:** Meet the coefficient of luminous intensity requirements of ASTM 4280 after abrasion. Each marker shall be marked as abrasion resistant by the manufacturer.

**970-1.3.3 In-service Minimum Reflective Intensity:** The Class B reflective pavement marker shall retain a minimum coefficient of luminous intensity for 12 months of not less than 25% of the values shown in Table 1 of ASTM D 4280, and a minimum luminous intensity of 0.2 cd/fc at the end of two years.

**970-1.4 Application Properties:** Application properties shall meet the requirements of Section 706.

**970-1.5 Packaging and Labeling:** Shipment shall be made in containers which are acceptable to common carriers and packaged in such a manner as to ensure delivery is in perfect condition. Each package shall be clearly marked as to the name of the manufacturer, type, color, quantity enclosed and date of manufacture. Show the designation of the marker in accordance with ASTM D 4280.

### 970-2 Bituminous Adhesive For Pavement Markers.

**970-2.1 General:** Bituminous adhesive as recommended by the marker manufacturer shall be used for bonding the markers to the pavement.

**970-2.2 Specific Requirements for Bituminous Adhesives:** The bituminous adhesive shall meet the properties of adhesives per ASTM D 4280 Section A1, including filler-free and filler alone properties.

**970-2.3 Performance Requirements:** The performance of the adhesive shall be determined in accordance with the test methods listed in ASTM D 4280.

**970-3 Product Acceptance on the Project.**

Acceptance will be made in accordance with the requirements of Section 706. Manufacturers seeking evaluation of their product shall submit an application in accordance with Section 5.

Revised  
11

## REFLECTIVE PAVEMENT MARKERS

### SECTION 970

### MATERIALS FOR RAISED RETRO-REFLECTIVE PAVEMENT MARKERS AND BITUMINOUS ADHESIVE

#### 970-1 Raised Retro-Reflective Pavement Markers.

**970-1.1 Composition:** The marker shall consist of materials conforming to ASTM D 4280.

**970-1.2 Physical Requirements:** The physical size of the RPM shall conform to the requirements of ASTM D 4280. Laboratory and field samples for RPMs and bituminous adhesives shall meet the requirements of ASTM D 4280 and include the following requirements:

The minimum area of each reflective face shall be  $2.5 \text{ in}^2$  [ $1,600 \text{ mm}^2$ ]. The minimum base size shall be  $12 \text{ in}^2$  [ $7,750 \text{ mm}^2$ ].

**970-1.2.1 Designation of Marker Type, Color and Classification:** The marker description shall be in order of type, color and reflective surface condition in accordance with the following charts.

RPM Type		
A	2 way reflective	1 color
B	1 way reflective	1 color
D	1 way reflective	2 colors (one way reflective with nonreflecting white surface on opposite side)
E	2 way reflective	2 colors

Reflective Face Color *					
Color	White	Yellow	Red	Blue	Green
Code	W	Y	R	B	G

\* The color of the marker shall meet the requirements of ASTM D 4280.

RPM Class			
Class	Description	Expected Normal Service	ASTM Surface Designation
A	Temporary marker	Up to six months	none
B	Permanent marker	Long life	H; hard abrasion resistant lens
D	Work zone marker	Per project requirement	none
E	Temporary work zone	Up to five days	none

**970-1.3 Performance Requirements:** The RPM shall meet the performance requirements as specified in ASTM D 4280 Section 6.2 for coefficient of luminous intensity, flexural strength, compressive strength, resistance to cracking and thermal cycling. Test method FM 5-566 shall be applied to evaluate marker performance.

**970-1.3.1 Class A markers:** Meet the coefficient of luminous intensity requirements of ASTM D 4280, which the abrasion treatment is not required. Class B markers (abrasion resistant) shall meet the coefficient of luminous intensity requirements of ASTM D 4280 after abrasion and shall be designated by the manufacturer in accordance with ASTM D 4280.

**970-1.3.2 In-service Minimum Reflective Intensity:** The reflective pavement marker shall retain a minimum coefficient of luminous intensity for 18 months of not less than 30% of the values shown in Table 1 of ASTM D 4280. Replacement of pavement markers should be planned after the coefficient of luminous intensity drops below 0.02 cd/lx.

## REFLECTIVE PAVEMENT MARKERS

SECTION 970  
MATERIALS FOR RAISED RETRO-REFLECTIVE PAVEMENT  
MARKERS AND BITUMINOUS ADHESIVE

## 970-1 Raised Retro-Reflective Pavement Markers.

970-1.1 Composition: The marker shall consist of materials conforming to ASTM D 4280.

970-1.2 Physical Requirements: The physical size of the RPM shall conform to the requirements of ASTM D 4280. Laboratory and field samples for RPMs and bituminous adhesives shall meet the requirements of ASTM D 4280 and include the following requirements:

The minimum area of each reflective face shall be  $2.5 \text{ in}^2$  [ $1,600 \text{ mm}^2$ ]. The minimum base size shall be  $12 \text{ in}^2$  [ $7,750 \text{ mm}^2$ ].

970-1.2.1 Designation of Marker Type, Color and Classification: The marker description shall be in order of type, color and reflective surface condition in accordance with the following charts.

RPM Type		
A	2 way reflective	1 color
B	1 way reflective	1 color
D	1 way reflective	2 colors (one way reflective with nonreflecting white surface on opposite side)
E	2 way reflective	2 colors

Reflective Face Color *					
Color	White	Yellow	Red	Blue	Green
Code	W	Y	R	B	G

\* The color of the marker shall meet the requirements of ASTM D 4280.

RPM Class			
Class	Description	Expected Normal Service	ASTM Surface Designation
A	Temporary marker	Up to six months	none
B	Permanent marker	Long life	H, hard abrasion resistant lens
D	Work zone marker	Per project requirement	none
E	Temporary work zone	Up to five days	none

970-1.3 Performance Requirements: The RPM shall meet the performance requirements as specified in ASTM D 4280 Section 6.2 for coefficient of luminous intensity, flexural strength, compressive strength, resistance to cracking and thermal cycling. Test method FM 5-566 shall be applied to evaluate marker performance.

970-1.3.1 Class A markers: Meet the coefficient of luminous intensity requirements of ASTM D 4280, which the abrasion treatment is not required. Class B markers (abrasion resistant) shall meet the coefficient of luminous intensity requirements of ASTM D 4280 after abrasion and shall be designated by the manufacturer in accordance with ASTM D 4280.

970-1.3.2 In-service Minimum Reflective Intensity: The reflective pavement marker shall retain a minimum coefficient of luminous intensity for 18 months of not less than 30% of the values shown in Table 1 of ASTM D 4280. Replacement of pavement markers should be planned after the coefficient of luminous intensity drops below  $0.02 \text{ cd/lx}$ .

**FF-W-1825A Wool and Gauze, Metallic**

**3. LABORATORY TESTS PROCEDURES**

- 3.1 Flexural Strength** *ASTM REVISOR PROCEDURE.*
- 3.1.1** Condition markers in accordance with ASTM 4280, 9.3.1.1.
- 3.1.2** Align marker with test equipment and apply load in accordance with ASTM 4280, 9.3.1.2 and 9.3.1.3.

**970-1.4 Application Properties:** Application properties shall meet the requirements of Section 706.

**970-1.5 Packaging and Labeling:** Shipment shall be made in containers which are acceptable to common carriers and packaged in such a manner as to ensure delivery is in perfect condition. Each package shall be clearly marked as to the name of the manufacturer, type, color, quantity enclosed and date of manufacture. Show the designation of the marker in accordance with ASTM D 4280.

**970-1.6 Certification:** For initial product approval, the marker manufacturer and bituminous adhesive manufacturer shall furnish to the State Materials Office a certified test report from an approved independent test laboratory that affirms the materials meet all requirements specified. After initial product approval, the manufacturer shall submit copies of this test report and verification in accordance with this specification, Section 706 and FM 5-566 to the State Materials Office for ongoing contracts. If the results of tests performed on these products indicate failure to comply with any specific requirement of the product or indicate significant inconsistencies in material properties, new qualification tests may be required for the particular material. Any marked variation from the original test values for a material will be considered sufficient evidence the composition and/or properties of the materials have changed.

## **970-2 Bituminous Adhesive For Pavement Markers.**

**970-2.1 General:** Bituminous adhesive as recommended by the marker manufacturer shall be used for bonding the markers to the pavement. The adhesive used shall be a product included on the Qualified Products List.

**970-2.2 Specific Requirements for Bituminous Adhesives:** The bituminous adhesive shall meet the properties of adhesives per ASTM D 4280 Section A1, including filler-free and filler alone properties.

**970-2.3 Performance Requirements:** The performance of the adhesive shall be determined in accordance with the test methods listed in ASTM D 4280.

## **970-3 Qualified Products List (QPL).**

Manufacturers seeking approval for a Raised Retro-Reflective Pavement marker or bituminous adhesive shall submit an application, Material Safety Data Sheet (MSDS) and certification in accordance with 6-1. Final acceptance will be based on tests and verification in accordance with this Specification.

- 3.1.3 Check marker for cracking or breakage.
  - 3.1.4 Breakage or significant deformation per ASTM D 4280 constitutes a failure.
  - 3.2 Compressive Strength
    - 3.2.1 Perform compressive test in accordance with ASTM 4280, 9.3.2.
    - 3.2.2 Check marker for cracking or breakage.
    - 3.2.3 Breakage or significant deformation per ASTM D 4280 constitutes a failure.
  - 3.3 Coefficient of Luminous Intensity
    - 3.3.1 The Pre-test Conditioning of new marker includes preparing the reflective face of hard abrasion resistant lens Markers, Class B markers, in accordance with ASTM 4280, 9.2.2 prior to Test Procedure 3.3. The load specified in ASTM D 4280, 9.2.2 shall be applied continuously while rubbing across the face of the marker. Irregular shaped reflective surfaces shall have an equivalent load applied against the face while rubbing with the steel wool (approximately 63 psi).
- Note 1: No surface preparation required for Class A, D and E markers.
- 3.2 Pretest conditioning of markers removed from the field includes performing Test Procedure 3.3 without any cleaning of reflective face for initial reading. Perform a second reading after cleaning the reflective face with water and a soft cloth.
  - 3.3 Measure the coefficient of luminous intensity in accordance with ASTM 4280, 9.2.1. As suggested by ASTM 4280, a 30.5-m (100-ft) test distance arrangement will take test precedence over shorter test distances. Average observed values for the coefficient of luminous intensity less than the values specified in Standard Specification Section 970 per each color constitutes a failure of the marker.
  - 3.4 Color: Measure color in accordance with ASTM 4280, 9.4
  - 3.5 Resistance to Cracking
    - 3.5.1 Condition marker in accordance with ASTM 4280, 9.5.1.

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- 3.5.2 Impact the reflective face of the marker in accordance with ASTM 4280, 9.5.1.1.
  - 3.5.3 Check marker in accordance with ASTM 4280, 9.5.1.2.
  - 3.5.4 Impact area shall exhibit only concentric cracks, any radial cracks constitutes a failure.
  - 3.6 Resistance to Temperature Cycling
    - 3.6.1 Condition the marker in accordance with ASTM 4280, 9.5.2
    - 3.6.2 Inspect the marker in accordance with ASTM 4280, 9.5.2.1, any cracking or delamination constitutes a failure.
  - 3.7 Number of Tests and Retests
    - 3.7.1 The number of markers constituting a sample for each laboratory test is defined in accordance with ASTM 4280, Section 8. The sample size for field evaluation of new markers for QPL evaluation is listed in Section 4.2.1 below. The sample size for project product quality control is five (5) markers.
    - 3.7.2 Perform the tests in the order listed in accordance with ASTM 4280, Section 8.
    - 3.7.3 Retest failed samples in accordance with ASTM 4280, Section 8.
  - 4. FIELD EVALUATION - QUALIFIED PRODUCT LIST (QPL) EVALUATION
    - 4.1 Equipment
      - 4.1.1 The equipment used for the evaluation of the laboratory tests and field evaluation shall be in accordance with ASTM 4280.
      - 4.1.2 The equipment shall be used in accordance to the equipment manufacturer=s instruction manuals.
    - 4.2 Material Quantities and Labeling
      - 4.2.1 Class A, D and E markers: fifty (50) clear - blank makers.
      - 4.2.2 Class B markers: One hundred forty (150) clear - blank markers.
      - 4.2.3 The manufacturer shall supply new markers from production line which have manufacturer=s name and model number and other required

designations in accordance with ASTM 4280, 4. Classification.

- 4.2.4 The manufacturer shall inscribe permanent unique marker numbers for test data traceability on each marker.
- 4.3 Roadway Type
  - 4.3.1 The selected roadway for the field test shall be asphaltic concrete.
  - 4.3.2 The selected roadway shall not have any restricted flow of traffic during the duration of the field evaluation.
- 4.4 Average Daily Traffic Count (ADT)
  - 4.4.1 ADT of 8,000 to 12,000 vehicles per lane.
  - 4.4.2 Minimum of two unidirectional lanes.
- 4.5 Application
  - 4.5.1 The RPMs shall be installed in accordance with Standard Specifications Section 706.
  - 4.5.2 The bituminous adhesive used shall be a QPL product.
- 4.6 Test Site
  - 4.6.1 The field evaluation markers shall be installed in between and in-line with normally spaced permanent markers.
  - 4.6.2 The test site shall be approved by the Product Evaluation Department.
- 4.7 Duration of Test Evaluation
  - 4.7.1 Class A (Temporary) markers - three (3) month field test.
  - 4.7.2 Class B (Permanent) markers - two year field test.
  - 4.7.3 Class (Work Zone) D markers - one (1) month field test.
  - 4.7.4 Class (Temporary Work Zone) E markers (five day) - one (1) week field test.
- 4.8 Pre-Field Tests
  - 4.8.1 Each marker will be tested per Section 3.3 for the coefficient of

luminous intensity

- 4.8.2. A random sample from the supplied markers will be taken for additional pre-tests. Each test listed in Section 3 above under Laboratory Test Procedures shall be conducted. The sample must pass all the pre-tests before approval for installing the markers for the field test is given.
- 4.8.3. The remaining markers from the laboratory test shall be installed on the approved field test site. The test site for Class A and D markers will be inspected once per month and ten (10) markers will be removed from the test site and tested in accordance with Section 3.3 listed above. The test site for Class B markers will be inspected every six months and twenty (20) markers will be removed from the test site and tested in accordance with Section 3.3 listed above.
- 4.8.4. The coefficient of luminous intensity shall be recorded for each month from the RPMs sampled from the test site. The values will be plotted and extrapolated to determine service life and durability based on Standard Specification 970.

## **10.11 Channelizing Devices**

### **10.11.1 Type III Barricades**

Two Type III barricades should be used to block off or close a roadway. Whenever two barricades are used together, only one warning light is required on each barricade.

### **10.11.2 Separation Devices**

Placing two lane two-way operations (traffic) (TLTWO) on one roadway of a normally divided highway should be a last resort (see *MUTCD*) and should be done with special care.

When traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated either with portable barrier wall or Temporary Traffic Separators (see the *Design Standards, Index 614*). The use of striping, raised pavement markers, and complementary signing, either alone or in combination is not considered acceptable for separation purposes.

### **10.11.3 Channelizing Device Alternates**

It is intended that cones, Type I and II barricades, vertical panels, drums and tubular markers be considered as alternative channelizing devices to be used at the contractor's option. The only exceptions to this are that tubular markers are not allowed at night and the use of cones at night is restricted. (See the *Design Standards, Index 600 & 614*). The designer should not further restrict the options of channelizing devices.

**Qualified Products List (QPL)**  
**Specification 706 RAISED RETRO-REFLECTIVE PAVEMENT MARKERS**  
**AND BITUMINOUS ADHESIVE**

**S706 Raised Pavement Marker**

<b>QPL Number</b>	<b>Other References</b>	<b>Product ID</b>	<b>Manufacturer</b>	<b>App Date</b>
S706-0100 Old # V600	S 970	Stimsonite 88 Type: Class A	Avery Dennison 6565 West Howard St. Niles, IL 60174-0087 (847) 647-7717	3/6/1985
Comments and Limitations: 4" X 4"				
S706-0101 Old # V601	S 970	Ray-O-Lite Square Shoulder Marker Type: Class A	Pac-Tec Inc 1870 James Parkway Heath, OH 43056 (800) 848-7025	3/6/1985
Comments and Limitations: 4" X 4"				
S706-0102 Old # V502	S 970	3M 290 Series Type: Class A	3M Company 3-M Center Bldg. 235 3b-55 Saint Paul, MN 55144-1000 (651) 737-2933	6/14/2001
Comments and Limitations:				
S706-0103 Old # V503	S 970	Stimsonite 911 Type: Class A	Avery Dennison 6565 West Howard St. Niles, IL 60174-0087 (847) 647-7717	5/29/2002
Comments and Limitations:				
S706-0205 Old # V524	S 970	AA-ARC II-FH Type: Class B	Pac-Tec Inc 1870 James Parkway Heath, OH 43056 (800) 848-7025	5/22/2001
Comments and Limitations: For Use Only On Projects Let 01-2001 Or After				
S706-0300 Old # V555	S 970	JB-1 (Wht&Ylw) Type: Class C	Highway Ceramics Inc P.O. Box 6508 Yuma, AZ 85366 (602) 726-0241	6/14/1993
Comments and Limitations: 6" X 6" Jiggle Bar- Channel Marker				

Raised Pavement Marker

<u>QPL Number</u>	<u>Other References</u>	<u>Product ID</u>	<u>Manufacturer</u>	<u>App Date</u>
5708-0400 Old # V580	S 970	TOM Type: Class E	Bunzl Extrusion Tacoma 3110 70th Ave E Tacoma, WA 98424-3600 (800) 822-7528	8/1/1995
Comments and Limitations	4" X 2.25"			

# RPM PERFORMANCE TEST

FH

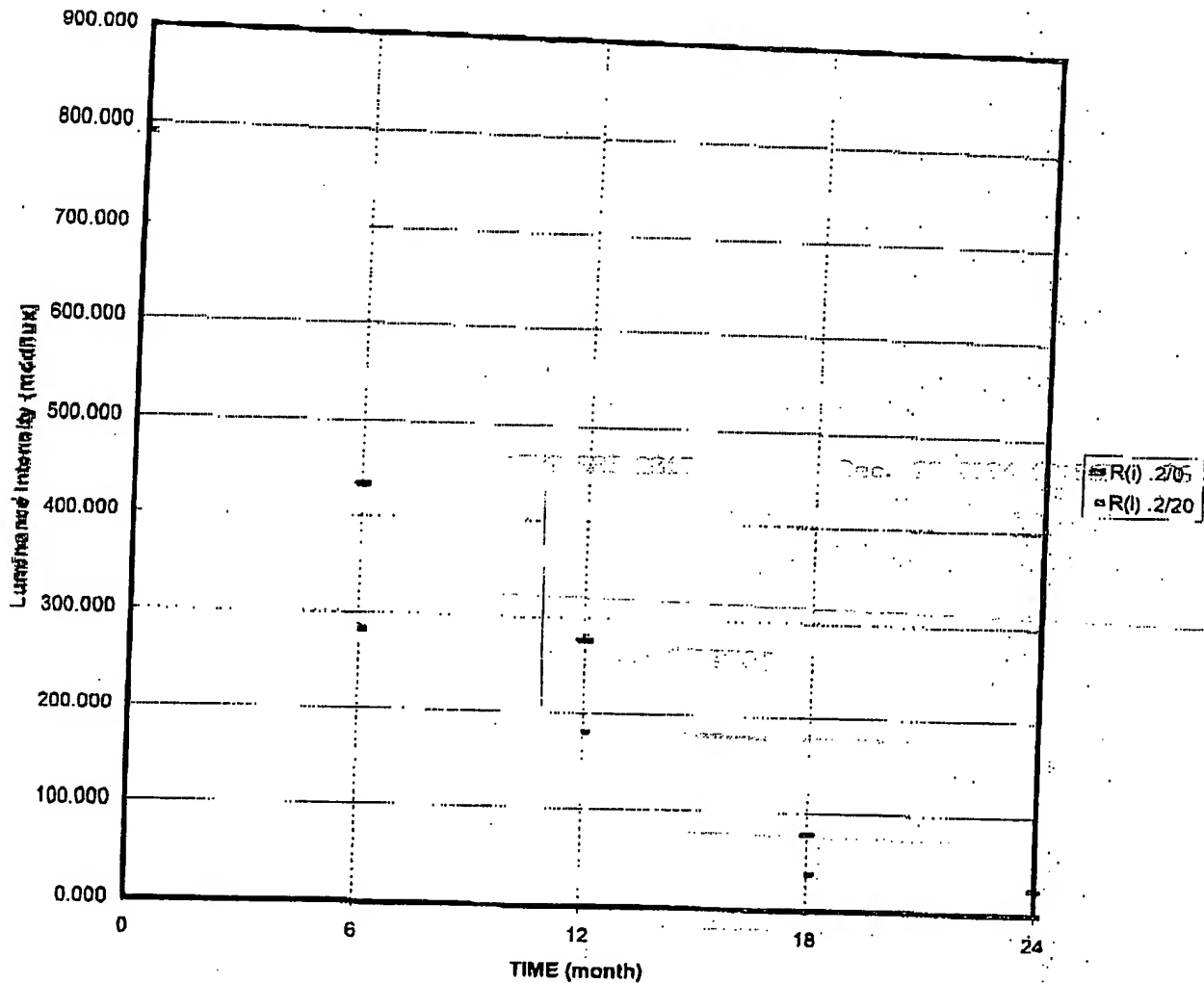


Figure 1: PE- RPM 2001-Pac-Tec-FH BW-Specific Intensity Field Performance Test (2-01 to 2-03) Initial, 6, 18, 24 Mon.

At spec 970 requirement 0.2 cd/lx at the end of two years.

Luminous Results Table.

3/20/2003

Time (month)	Luminous Intensity gam = .2; beta= 0 (mcd/lux)	Luminous Intensity gam = .2; beta= 20 (mcd/lux)
0	1531.6	790.7
6	433.3	283.9
12	278.2	179.4
18	77.6	37.9
24		Not Detected

Note: 25.7 mcd/lux @ 0.025 cd/lux @ 0.28 cd/lux

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